



**UNITED STATES DEPARTMENT OF COMMERCE**  
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/092,158    06/05/98    MERCHANT

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EXAMINER
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MM91/0829

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ART UNIT	PAPER NUMBER

2823

DATE MAILED:

08/29/00

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

**Advisory Action**

Application No.

09/092,158

Applicant(s)

MERCHANT ET AL.

Examiner

Art Unit

Kurt M. Eaton

2823

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 15 August 2000 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE. Therefore, further action by the applicant is required to avoid abandonment of this application. A proper reply to a final rejection under 37 CFR 1.113 may only be either a timely filed amendment which places the application in condition for allowance or a Notice of Appeal. Alternatively, applicant may obtain further examination by timely filling a request for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d).

**PERIOD FOR REPLY** [check only a) or b)]

- a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.  
b) ☐ In view of the early submission of the proposed reply (within two months as set forth in MPEP § 707.07 (f)), the period for reply expires on the mailing date of this Advisory Action, OR continues to run from the mailing date of the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

Extensions of time may be obtained under 37 CFR 1.136 (a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked.

1. ☐ A Notice of Appeal was filed on \_\_\_\_\_. Appellant's Brief must be filed within the period set forth in 37 CFR 1.192(a), or any extension thereof (37CFR 1.191(d)), to avoid dismissal of the appeal.
2. ☐ The proposed amendment(s) will be entered upon the timely submission of a Notice of Appeal and Appeal Brief with requisite fees.
3. ☐ The proposed amendment(s) will not be entered because:
- (a) ☐ they raise new issues that would require further consideration and/or search. (see NOTE below);
  - (b) ☐ they raise the issue of new matter. (see Note below);
  - (c) ☐ they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
  - (d) ☐ they present additional claims without canceling a corresponding number of finally rejected claims.
- NOTE: \_\_\_\_\_
4. ☐ Applicant's reply has overcome the following rejection(s): \_\_\_\_\_.
5. ☐ Newly proposed or amended claim(s) \_\_\_\_\_ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
6. ☒ The a) ☐ affidavit, b) ☐ exhibit, or c) ☒ request for reconsideration has been considered but does NOT place the application in condition for allowance because: See Attachment to Advisory Action.
7. ☐ The affidavit or exhibit will NOT be considered because it is not directed SOLELY to issues which were newly raised by the Examiner in the final rejection.
8. ☒ For purposes of Appeal, the status of the claim(s) is as follows (see attached written explanation, if any):
- Claim(s) allowed: 0.
  - Claim(s) objected to: 0.
  - Claim(s) rejected: 1, 2, 4-12, and 14-24.
  - Claim(s) withdrawn from consideration: 0.
9. ☐ The proposed drawing correction filed on \_\_\_\_\_ a) ☐ has b) ☐ has not been approved by the Examiner.
10. ☐ Note the attached Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_.
11. ☐ Other:

### ATTACHMENT TO ADVISORY ACTION

1. The period for reply continues to run 3 MONTHS from the date of the final rejection. Any extension of time must be obtained by filing a petition under 37 CFR 1.136(a) accompanied by the appropriate fee. The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. A reply within the meaning of 37 CFR 1.113 must be timely filed to avoid abandonment of this application.

2. The Request for Consideration filed 8/15/00 has been entered and considered but does not overcome the rejection due to the following reasons.

Applicant contends the references relied upon by the examiner in the previous Office Actions are improperly combined, and therefore fail to establish a prima facie case of obviousness with respect to applicants present invention. Applicant supports this assertion by addressing the fact that Chen is directed to a CVD process of forming an adhesive layer for a blanket layer that includes a Ti film, a Ti-rich TiN film, a  $\text{TiSi}_x$  film, or a TiN film within a contact opening and specifically teaches away from using a PVD process, as disclosed in the applicants admitted prior art and Schinella. Applicant further states that one skilled in the art would not be motivated to combine the PVD process of the applicants admitted prior art and the CVD process required by Chen and that is why the combination of Chen and the applicants admitted prior art is improper. The examiner wholeheartedly agrees with applicant in that references cannot be combined where they teach away from their combination and, accordingly, the examiner agrees with applicant that one of ordinary skill in the art would not be motivated to combine the PVD process of the applicants admitted prior art with the CVD process of Chen. However, the PVD process of the applicants admitted prior art

was not combined with the CVD process of Chen and, accordingly, the nature of the teaching in the combination is highly relevant and must be taken into account as well MPEP 2145.

The teaching taken from Chen was the annealing process of the equivalent structure found in applicants admitted prior art in view of Schinella and did not render the prior art unsatisfactory for its intended use. The examiner respectfully submits that one of ordinary skill in the art would find it reasonable, given the structure of applicants admitted prior art in view of Schinella, to take Chen, view its method on how to reduce the resistance of its contacts by annealing a structure including a contact hole, within a dielectric layer and exposing a contact region, lined in sequence with a titanium layer, a TiN layer, and a W plug such that the various metal layers are found solely within the contact hole, and apply an annealing procedure to reduce the contact resistance of the contact metallization. As can readily be seen, the nature of the applied teaching does not teach away from the combination of references because it does not render the prior art unsatisfactory or change the principle operation of the prior art.

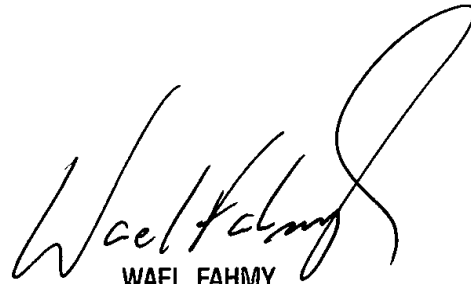
Furthermore, regardless of the PVD teachings of Chen, other well known factors not disclosed by Chen influence the step coverage properties of PVD deposited films such as the aspect ratio of the contact hole, sputtering power, and sputtering temperature, to name a few. Given this observation, along with the fact that the Ti and TiN films of applicants admitted prior art are continuous and have sufficient step coverage and thickness within the contact hole to prevent the diffusion of W into the substrate during the anneal, one of ordinary skill in the art would readily recognize that the prior art teaching of the PVD process in Chen is not completely adequate for evidence that the PVD process of the applicants admitted prior art cannot work or should never be used.

Art Unit: 2823

*Conclusion*

3. Paper related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication of earlier communication from the examiner should be directed to **Kurt Eaton** at **(703) 305-0383** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via [kurt.eaton@uspto.gov](mailto:kurt.eaton@uspto.gov).

  
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TECHNOLOGY CENTER 2800